

# NASA TECH BRIEF

## Ames Research Center

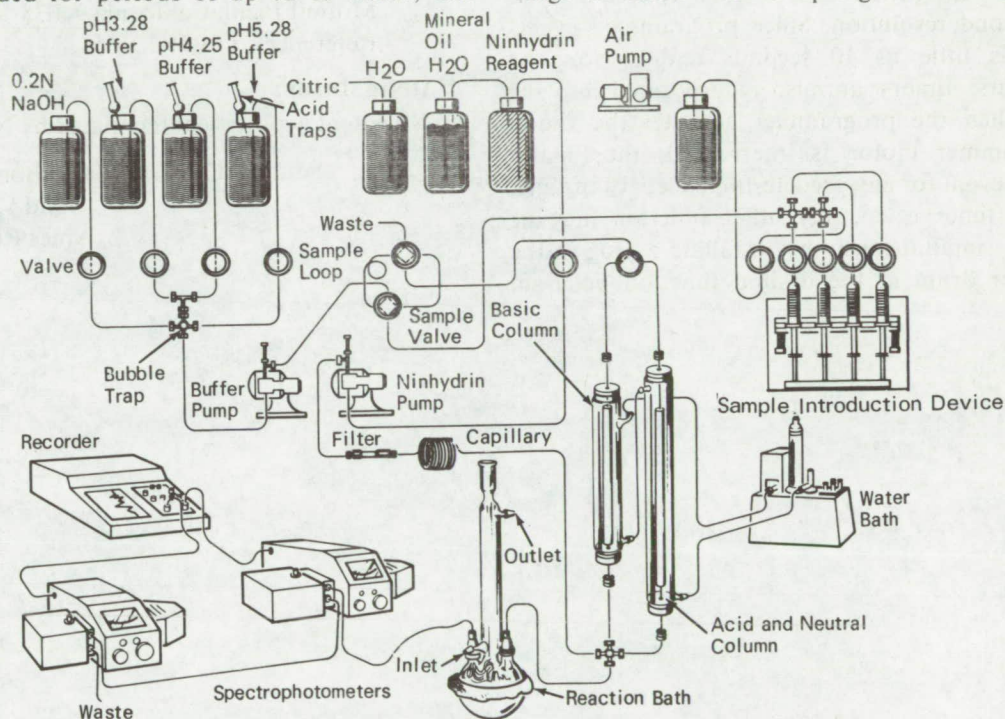


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### Automatic Amino Acid Analyzer

A fully automatic amino acid analyzer, fabricated from readily available commercial components, operates unattended for periods of up to 15 hours, and

The sample-injection device consists of four 2.5-ml disposable syringes clamped in a bracket. Each syringe is fitted with a spring that stores sufficient



nearly doubles the number of amino acid analyses that could previously be completed by one analyst in a single working day.

The apparatus is essentially a conventional amino acid analyzer based on the ninhydrin reaction, with the additional feature of an automatic sample-injection system. The analyzer may be programmed, and all fluid-flow valve switching is accomplished pneumatically from miniature three-way solenoid pilot valves.

energy to empty the syringe and fill the sample loop volume (250  $\mu$ l) in less than 10 seconds. When one of the fluid-flow valves is actuated, its spring causes the plunger to force the contained sample (approximately 1.5 ml) through the manifold and into the sampling valve. After a sample has been injected, a valve in the manifold opens, and distilled water enters to clear the sample loop. Two syringes containing portions of the same sample are used for each complete analysis; one is for the

(continued overleaf)

analysis on the acid and neutral column, and one is for the analysis on the basic column. Since portions of the same sample are sequentially injected into the system, the sample loop is washed only after every other syringe injection.

The rest of the analytical system is essentially the same as that used in commercial amino acid analyzers, except that all functions are controlled automatically. Spectrophotometer outputs in the range from 0 to 100% transmittance are recorded on a standard strip chart recorder. The transmittance peak heights are measured and converted into absorbance units for final computations.

The automatic control function is provided by rotating-drum programmers, each with a capacity of 10 functions and 60 events for each function. Because 15 functions are required, two ten-function programmers are ganged together with a common drive motor and fitted with a 1/10 rpm motor to give 10-second resolution. Since programmed events can last as little as 10 seconds and as long as several hours, timers are also incorporated into the system. When the programmer activates the timer, the programmer motor is interrupted, thus maintaining the event for any predetermined length of time. When any timer is on, any other function may be carried out simultaneously by installing a plug in the programmer drum at the desired function position.

A bank of manual switches provides selective operation of any valve, regardless of program sequence, as well as a manual switch to stop the programmer. All switches can be operated without making a permanent change in the program.

The low dead-volume valves and plumbing, and the precise timing by the programming system, permit a high degree of accuracy in the results obtained. With few exceptions, relative standard deviations are 1.9% or less.

#### **Notes:**

1. For long-term unattended operation, the number of syringes can be increased and the capacity of the programmer extended.
2. Requests for further information may be directed to:

Technology Utilization Officer  
Ames Research Center  
Moffett Field, California 94035  
Reference: TSP71-10165

#### **Patent status:**

No patent action is contemplated by NASA.

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